REPAIR MANUAL

of the

GOODRICH FABRIC TIRE

THE B.F.GOODRICH RUBBER COMPANY

AKRON, OHIO

OREWORD—

In no line of business are the little details of so much importance as in the repair of automobile tires. Tires are forced to bear the brunt of wear and tear so that the slightest imperfection or weakness in them or in their repair spreads immediately to the surrounding area, generally ruining cases for further service. The man who drives an automobile demands that a repaired casing be fully as strong as it was before injured, possibly stronger.

The method described in this book is the result of years of study by the Repair Department of The B.F.Goodrich Rubber Company. It may vary in some respects from the methods which you are using at present. Ordinary equipment only, is required; little, if any more material, and a trifle more time.

Any further information will be freely given upon request.

THE B.F.GOODRICH RUBBER COMPANY

How to Make a Sectional Repair

THE chief point of difference which may exist between the improved method and that which the repair man may be using would be in making sectional repairs. In the following pages we wish to take you through every step of the repair of a 35 x 4½ in. casing which was ruptured from bead to bead after a severe injury.

The illustrations accompanying this article were made from photographs taken during the process. This was done so that actual examples might be shown.

How to Tear Down the Casing for Sectional Repair

IN order to properly take the injury out of the casing the Goodrich method demands that if the rupture has extended to every ply, *all plies* BUT ONE must be removed. If this is not done the ruptured ends of the fabric will literally grind and chafe through the inserted plies when the casing is again put in service. When only part of the plies have been injured *all* of the injured plies should be removed. So many repairs have come to our attention that have gone bad because of this one fault that our words of caution to the repair man cannot be too emphatic.

If, in removing the rubber and plies of fabric, the casing were cut down so that the incisions were made in the plies at one point there would be one big splice in the finished repair. This would result in a working joint. It is therefore necessary to STEP the fabric away *from* the injury; that is, a succession of steps should be made as shown in Figure No. 1.

In repairing this 35x4½ in. casing, made up of five plies of fabric every one of which was injured, three plies were removed from the outside and one from the inside. (Figures 2 and 3.) This left one injured ply attached to the inner side of the bead. (Figure 2.) The purpose of leaving one ply is for a foundation on which to build.

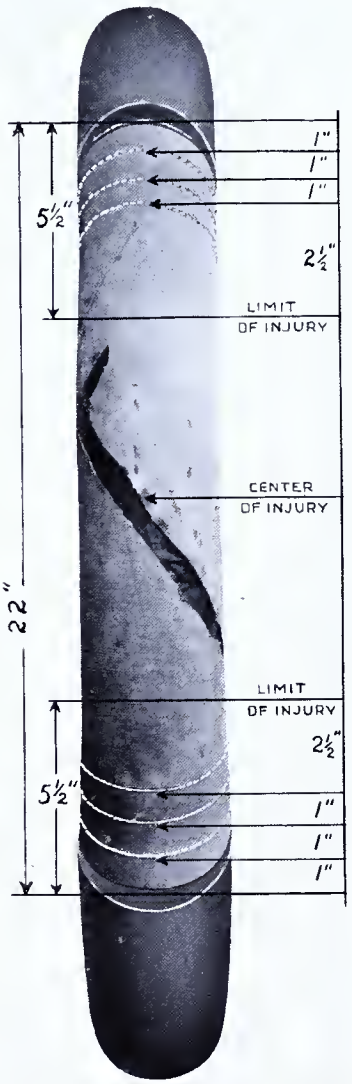


FIGURE 1

HOW TO TEAR DOWN A CASING FOR SECTIONAL REPAIR—Cont.

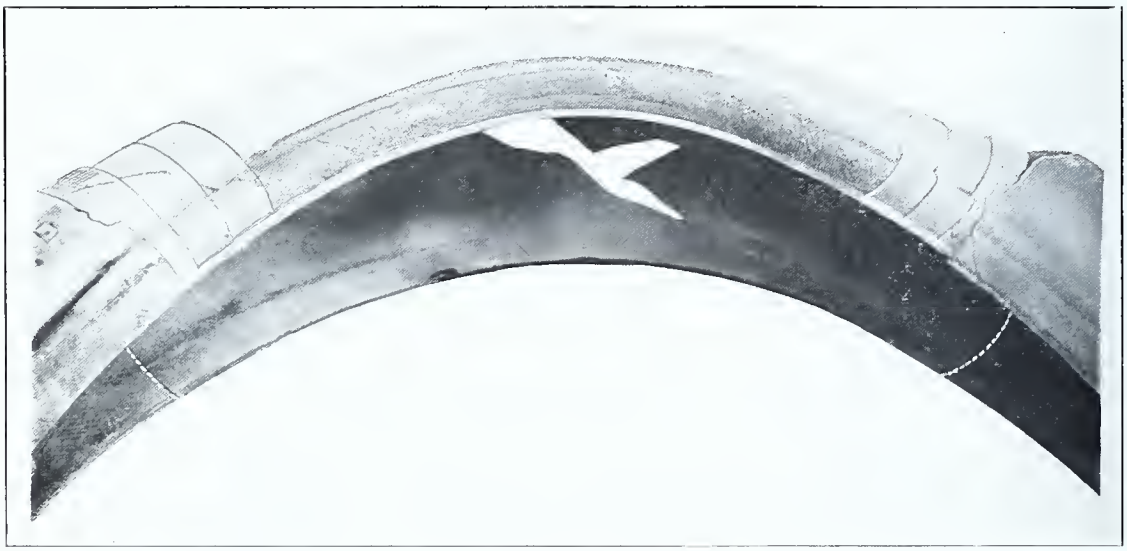


FIGURE 2

To prepare the casing for this treatment remove all of the rubber from the outside (including breaker strip and bead strip) at least five and one-half inches beyond each end of the injury. After all of the rubber has been removed measure *in* an inch from each end of the exposed fabric, and with a fabric knife *cut the first ply only* following it down to the toe of the bead on each side. Entirely remove this ply from the beads and case using a fabric hook for the purpose. One inch towards the injury from where you cut the first ply, cut the second and take it off to the toe of the bead. One inch nearer the injury cut the third ply and remove that to the center of the bead only. This step should be at least 2½ in. away from the end of the injury. (Figure 1.)

FIGURE 3

To remove the ply from the inside of the Casing, measure 1″ longer (back) on each end where the Rubber Tread was cut and remove according to instructions given for the first outside ply. This will make the inside ply 2″ longer than the longest (or first) outside ply (Figure 2).

Returning to the outside of the tire skive or bevel both edges of the rubber, and buff on a wire buffing wheel or with a hand wire brush

HOW TO TEAR DOWN A CASING FOR SECTIONAL REPAIR—Cont.

until the edges are well roughened up. (See Fig. 4.) If any of the old friction adheres to the fabric, buff the fabric lightly to remove it. This applies to the inside as well as the outside.

The tire should be thoroughly dried before cementing as the least moisture in the fabric will cause separation of the plies and consequently a bad repair. This moisture reaches the fabric through injuries. A small room or box, properly ventilated, with a temperature of 150 degrees dry heat is just the thing for this purpose. In the absence of these you will find that an inside vulcanizer answers nicely, if not quite so efficiently. (See Fig. 5.)

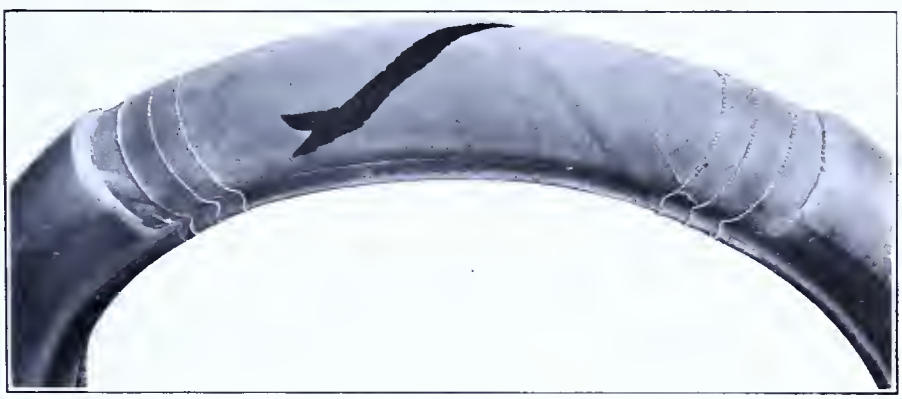


FIGURE 4

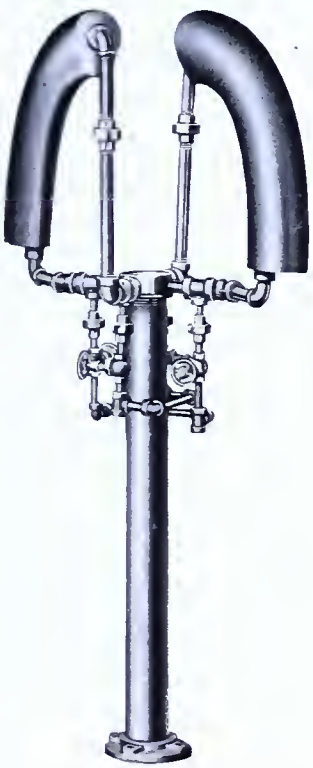


FIGURE 5
Inside Vulcanizer

A new series of measurements must be made when repairing tires of more or less than five plies. In a four-ply tire only two plies are removed from the outside and one from the inside. The incision in the tread should be 4½ in. from the limit of the injury. In a six-ply tire, three plies should be taken from the outside and two from the inside. The outside measurements will be the same as for the five-ply but you must allow an extra inch each end on the inside for the removal of the second ply. Figure 3 shows the usual relation of inside plies to the remainder of the case.

Re-Building the Casing

AFTER the casing is dried thoroughly and washed with benzine, apply one coat of cement (No. 434) both inside and out. After this has dried about one hour apply the second coat of good heavy (No. 434), putting on all it will stand and not run. The case should now be hung up to dry for at least three hours or over night. (See notes 14 and 15, page 20.) Now place the casing on a tire form and bind it if necessary; it must be held firmly so that the shape may be retained.

Cover the edge of the steps with strips of cushion gum (C-116) 1/64" thick, about ½" wide. This will keep these edges from chafing in the rebuilt section. Cover the edges of the injury and fill up the hole in the ruptured fabric with the same gum. This is of vital importance if the repair is to be successful.

Applying the Fabric

FABRIC MUST BE CUT ON THE BIAS, to insure a pliable repair that will act with the rest of the tire. New fabric has some stretch in it which should be taken out before applying. This can be done by stretching it over the tire last or form. Do not try to stretch it as you apply it to the tire. It will then conform to the old fabric which is to remain in the re-built section.

Replace each ply that has been removed, with new fabric No. 2130. See that the first ply butts evenly with its step. Roll it down firmly. Put the second and longer ply in place in the same manner. See Figure 6. The third ply, it will be noticed, extends to the tread rubber on the carcass of the case but at the beads it is butted the same as the first and second plies. In other words, the fabric *at the beads* should not overlap but be the same length as the fabric removed. Always build up the outside first so that the tire will retain its proper shape. This done, remove the casing from the form and hang conveniently over the workbench so that the casing just touches the table. Insert spreaders just beyond the ends of the repair to hold the beads apart, and proceed to cover the steps and edges of the injury on the inside of the casing with the cushion gum (C-116) the same as was done in the first operation.

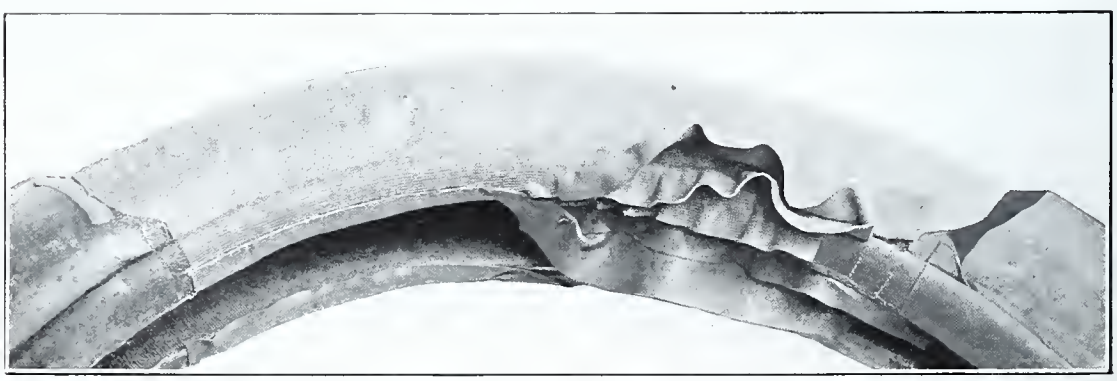


FIGURE 6

APPLYING THE FABRIC—Cont.

Now apply the new fabric No. 2130 for the inside ply which was removed, carefully butting it at its steps, then roll down firmly. To reinforce the inside, one extra ply of fabric No. 2130 or 2110 bareback is cut and inserted so that it will extend two or three inches beyond each end of the repair. (See Figure 7.)

FIGURE 7

Now hang the case over the table leaf or pins with a form inside. Apply a sheet of gum (C-116) 1 32″ thick over the entire repair DOWN TO THE BEADS. Replace the bead strips using fabric No. 4130. Use 1 16″ No. 817-G (dark), No. 788-G (red), W-10 (white) or W-20 (grey), unvuleanized gum on the side, depending upon the color of sidewall to be matched. Care should be taken to keep the gum about ⅛″ above the bead so that it will not overflow into the clinch while being cured. Skive or bevel this gum so that it will taper under the tread. See Figure No. 8. To replace breaker strip use fabric No. 3140 cut 3″ to 3½″ wide. Fill up the tread with No. 817-G (dark), W-10 (white), W-20 (grey) or 677-G (black), according to the shade of tread to be matched. As each piece is applied it should be rolled thoroughly. All air blisters should be removed by means of an awl. Use the stitcher freely around the edges, thus binding them together firmly. Now remove the easing from the form and paint it on the inside with tire paint (090 solution). Cure a Smooth Tread 45 minutes at 50 pounds steam pressure in cavity vuleanizer. Cure Non-skid treads with impression pad fifteen to twenty minutes longer than the Smooth tread.

FIGURE 8

Inside Repair

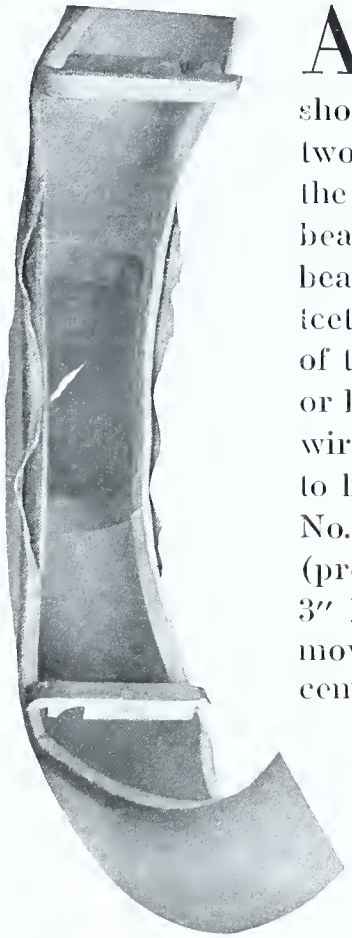


FIGURE 9
Inside of Case Cut Down for Inside Repair

A CUT through the tread of 2″ length or less, or a fabric break not involving all the plies of fabric should be cared for with an inside repair. Step out two plies of fabric for a space of 5″ at each end of the injury, removing first ply halfway around the bead, the second ply only to the toe or point of the bead. See Figure No. 9. To do this the bead or protection strip should first be loosened back to the heel of the bead. On the outside around the injury skive or bevel the tread to a feather edge. Then buff on a wire buffing wheel. See Figure 10. Wash the parts to be repaired with benzine and apply two coats of No. 434 cement, covering a space inside of the casing (previously prepared, buffed or scraped and cleaned) 3″ longer than the size of the fabric you have removed. *Allow at least an hour* for the first coat of cement to dry and from three to six hours for the

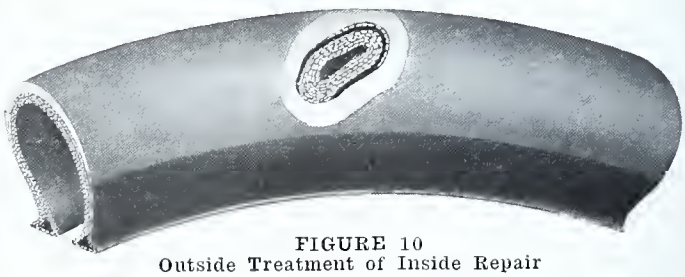


FIGURE 10
Outside Treatment of Inside Repair

second coat to dry; more if weather is cold or damp. Insert two plies of No. 2130 fabric. Fit them accurately to the space cut out and over this apply a patch (Figure 11) composed of two plies (stepped) of No. 2130 fabric—this patch to be 2″ longer at each end than the fabric stepped out. This should not extend closer than ¼ in. to the toe of the bead although of course one of the two plies previously stepped in, should go around the toe of the bead as far towards the heel as the cut-down extends. The bead strip is then rolled

FIGURE 11
Two-ply Patch for Inside Repair

INSIDE REPAIR—Cont.

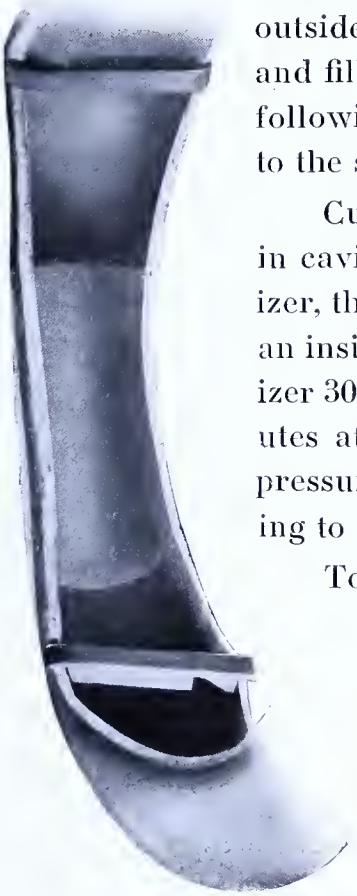


FIGURE 12
Ready for Curing

down into position. See Figure 12. Over the injury outside, apply a narrow strip of C-116 gum 1/32″ thick and fill up flush with the tread surface with one of the following gums, 817-G, W-10, W-20 or 677-G, according to the shade desired. See Figure 13.

Cure 45 minutes at 50 pounds steam pressure in cavity vuleanizer, then cure on an inside vuleanizer 30 to 45 minutes at the same pressure, according to the size of casing being repaired.

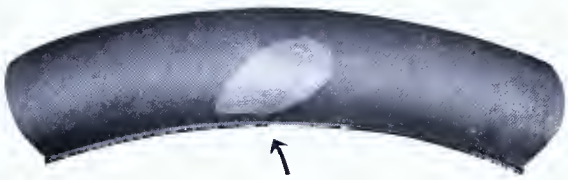


FIGURE 13
Outside Ready for Curing

To repair surfaee or tread cuts use the same treatment as described for Figures 10 and 13. Cure 45 minutes at 50 pounds steam pressure in eavity vuleanizer.

Rim Cuts

WHEN a case is rim cut through all plies proceed the same as for a sectional repair. If but one or two plies are cut remove gum, including bead strip, from side of case for a space of 2½″ to 3½″ above the bead. Step down first ply of fabrie the length of the cut, about ½″ below the rubber; remove this fabrie down to the toe of the bead. Buff, clean and apply two coats of No. 434 cement, drying eaeh eoat for two hours. Replace the fabric stepped out with No. 2130 fabrie overlapping it to the gum; then extend it around the bead and inside of the case about 3″, the inside portion having been previously eleaned and eemented. Reinforce the repair on the inside of the casing from bead to bead with one ply of No. 2130 fabrie. Replaee the bead strip with No. 4130 fabric. Fill in the gum removed with No. 817-G, W-10, W-20 or 788-G gum (aeeording to the color to be matched) 1/16″ thiek and cure 45 minutes at 50 pounds pressure in cavity vulcanizer.

Retreading—by Applying Built-Up Unvulcanized Treads

CUT down to the fabric around the circumference of the case from 2¼ inches to 3 inches above each bead, according to the size of the case. Remove the intervening tread from the fabric and skive or bevel the exposed edges of the gum. Buff them thoroughly on a wire buffing wheel. Be careful to dust off all rubber or fabric particles, using a whisk broom or fine wire hand brush for the purpose. Place in the tire a 2-ply pad so that the coil will not mark or injure the inside of the tire. This pad can be made by stripping down old casings. Insert wire coil to hold case rigid. Apply three coats of No. 431 Cement, allowing one hour for first coat to dry; two hours for the second and over night for the last coat to dry. The first coat should be very thin so that it will thoroughly penetrate the fabric. Apply 1/32″ strip of cushion gum (C-116) the width of the exposed fabric and roll down. Replace the breaker strip with No. 3140 fabric, width varying from 2 to 3 inches, depending on the size of the case. Bind the edges of the breaker strip with 1/2″ strips of C-116 gum 1/64″ thick to prevent air pockets here. Roll these down firmly. Apply raw gum tread band made up as described in the following section. Roll and stitch thoroughly, pricking out all air blisters with an awl. When this is done, stretch a strip of wet muslin (cut at an angle of 45 degrees to the weave) over the tread lengthwise to serve as a surface liner. Over this wrap completely around the casing the wrappers of wet muslin strips 3 in. wide, drawing as tightly as possible, then reverse and wrap in the opposite direction, using from ½″ to ¾″ step. Care should be taken to get the wrappers as tight as possible.

Building Up Unvulcanized Tread Bands

AN uncured tread band is composed of three or more plies of 1/16″ No. 817-G, No. W-10, No. W-20 or No. 677-G gum which should be built up as needed, on a stock table. Begin with the second widest ply which should be ¾ inch narrower than the widest ply, as shown in the table of dimensions on Page 26. Add the required number of plies each being ¾ inch narrower than the one immediately under it. Then invert these upon the widest ply so that the widest is at the top and the second widest at the bottom of the tread band. See Figure 14. Now adjust

FIGURE 14

the tread band to the case with the second widest ply next to the breaker strip. In making up the tread band care should be taken to roll each ply as laid and to remove all blisters with an awl.

Endless Semi-Cured Retreading Bands

PREPARE case same as for Unvulcanized Gum Tread Bands, using No. 906 instead of No. 434 Cement and Cushion gum. Carefully buff the inner side of the Retreading Band and wash with benzine or gasoline; apply two coats of No. 906 Cement, allowing about two hours for each coat to dry.

To Adjust Band to the Casing

AFTER the casing and the band have been prepared as above described, place a strip of muslin about 2″ wider than the tread all the way around the tire, slide the endless tread band over the muslin and center it, pulling the muslin out ahead of you as you adjust the band; roll down the tread thoroughly—start with the center and roll toward the sides as you revolve the case.

To Prepare the Case for Curing

CASES retreaded with Smooth Tread Bands should be prepared for curing in the same way that is recommended where Built Up Unvulcanized Treads have been applied—omitting the surface line. *Where Non-skid Tread Bands have been used* a paste should be made of soapstone and water mixed to the consistency of stiff mud. Apply this to the tread so that all crevices and depressions are filled. Lay a strip of wet muslin (cut at an angle of 45 degrees to the weave) over this and wrap tightly from left to right and then from right to left or vice versa. The soapstone serves a double purpose; it not only insures uniform pressure at all points in the tread but preserves the original shape of the tread projections perfectly.

Cure 30 minutes at 35 pounds pressure in a pot heater.

Motorcycle Cases

These are repaired the same as auto casings.

Repairing Inner Tubes

FIGURE 15
Hole Trimmed

TRIM and bevel the edges of the hole as shown in Figure 15. Wash the inner side of the tube and around the edges of the hole with benzine. Cement the edges of the hole and the inner side of the tube for a distance of 1½ inches, using No. 434 cement. Dry thoroughly. Cut a patch of Goodrich Combination Repair Sheet about 1½ inches to 2 inches larger than the hole. Wet this with benzine to lubricate it and insert with the raw-gum side outward. Figure 16. Allow the benzine to evaporate before putting against the wall of the tube. After having been set in position, roll thoroughly. Fill the hole flush with the tube, using 817-G, C-126, C-116 or 9977 quick cure gum. Figure 17.

Cures 12 to 20 minutes at 50 pounds steam pressure on a flat press. 9977 cures from 5 to 8 minutes. The result will be as in Figure 18.

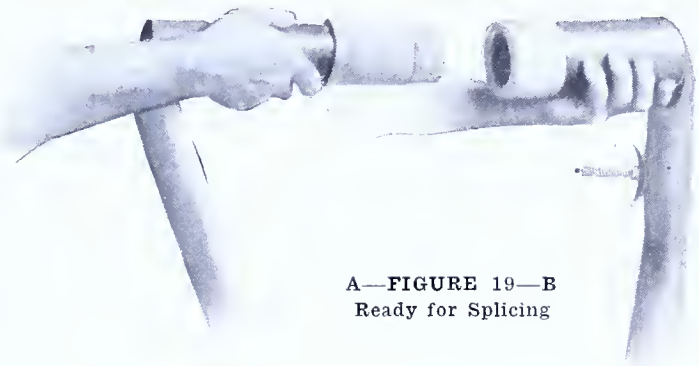
FIGURE 16
Inserting Patch

FIGURE 17
Ready for Cure

FIGURE 18
Cured

Splicing Inner Tubes

WHEN a tube has been injured so that an ordinary patch is not advisable, a section may save the tube for further service. This is called SPLICING. Cut out the damaged section with a pair of shears



A—FIGURE 19—B
Ready for Splicing

so that the ends of the good portion will be straight. Take a good piece of tube of the same cross-section size long enough to permit you to cut it 6 inches longer than the damaged piece removed. This 6″ is required for the splicing joints. Put one end of the tube through the smaller

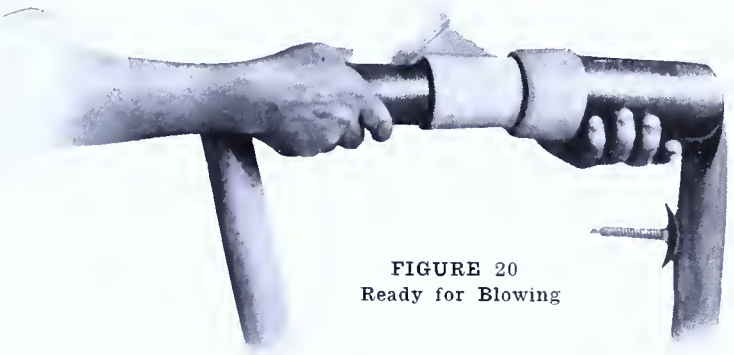


FIGURE 20
Ready for Blowing

splicer, fold the protruding end back on the splicer about 5″ and again fold it in the opposite direction 3″. This will make a double lap. See Figure 19-A. Put one end of the section to be joined through the larger splicer and fold it back 3″. See Figure 19-B. Taper the edges of the tube and section with a sharp knife to make a Smooth splice. Now roughen the surfaces to be joined with a wire buffer or wire hand brush taking care not to buff through or damage the rubber. Having done this, wash with benzine. Now apply to these rough surfaces a heavy coat of either No. 1 or No. 4 cement. Allow this to dry 15 to 20 minutes or more if necessary. Adjust the splicers as shown in Figure 20 and

SPLICING INNER TUBES—Cont.

apply curing solution No. 071 with a brush to the cemented portions of each splicer and blow or draw the lap from the large splicer on to and over the cemented portion on the small splicer. See Figure 21. Wrap

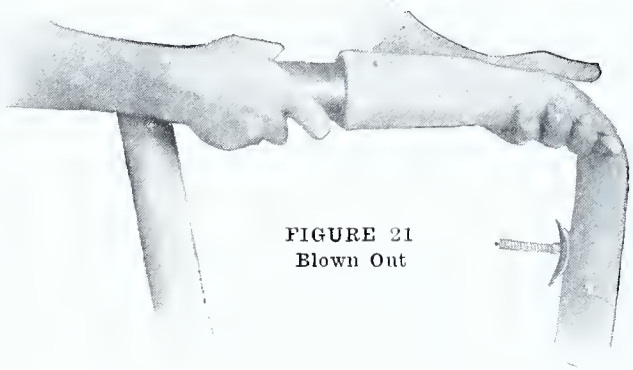


FIGURE 21
Blown Out

the connection tightly with a rubber band (a bicycle tube will do nicely) and keep under this pressure for 15 minutes. The free ends of the tube and splice should be joined in the same manner. Here care must be taken that the tube does not become twisted when making the final splice.

In case it is necessary to remove or loosen the valve for any purpose, be sure that the nuts and washers are properly put back in place and screwed down snug, but not tight enough to cut into the tube.

Always test tube under water to make sure that repair or splice, as case may be, is secure and that no small punctures have been overlooked. It is now ready for service.

Applying Valve Washers or Re-enforcements

(Acid Cure)

TO remove the old valve washer place the tube, washer side down, on a flat press until heated through. Pull off the washer while hot. *Roughen thoroughly* and clean the new washer on the tube side; treat the tube where the washer is to be applied, likewise. Now apply to each a heavy coat of either No. 1 or No. 4 cement. This should be allowed to dry 15 to 20 minutes or more if necessary. Immediately after having applied No. 071 curing solution to the cemented portion of the tube, place the washer in position and roll down for a minute or two, securing the edges carefully.

It is sometimes necessary to close the old valve hole and make a new one. It will be found practical to cut the new hole after buffing.

Tube Patches

(Acid Cure)

THE injured part of the tube should be treated the same as where a valve washer has been applied except that a rubber patch is substituted for the washer.

Single Tube Bicycle Tires

REMOVE all of the rubber from around the tire about 1½" each side of the injury, this will expose the fabric 3 or more inches. One-quarter of an inch in from the remaining rubber completely remove one ply of fabric from around the tire; lightly buff the fabric and ends of the rubber. After trimming the edges of the injury, remove all of the loose, foreign particles or dirt from the inside of the tire. The inner wall of the tire around the injury should be cleaned thoroughly with benzine. This may be done by stretching a piece of muslin over one finger and inserting it in the hole, if large enough, or by means of muslin bound round a small stick with no sharp corners. Now apply a coat of No. 434 cement both inside and out; allow this to dry for 10 hours. As this cement will set after 10 or 15 minutes so that it will not run, the time may be hung with the injury up or down. Cut a piece of Goodrich combination repair sheet about twice the size of the hole; after removing the Holland Gauze grasp it with a pair of pliers (See Figure 16) and dip the sheet in benzine, then insert it inside the tire with the raw-gum surface out. The benzine will act as a lubricant. Let dry 5 minutes then press the wall of the tire down on the patch with the thumb and forefinger. It should then be rolled well to insure complete adhesion. A mark in the center of the patch may help to place it. Fill the hole or cavity flush with the fabric, using 817-G gum. Now the tire should be slightly inflated to round it out. Reinforce this with a strip of No. 4130 fabric cut on the bias, wide enough to extend ½" on each side of the hole. Wrap this tightly around the tire so that the ends will over-lap at least ½ inch on the rim side. A second ply of No. 4130 fabric cut so as to butt the rubber at each end, should now be wrapped around the tire. This ply should be long enough so that the ends will over-lap ¼" on the rim side. Cover the section with a strip of 817-G gum 3 64" thick. Roll and stitch carefully, taking care to remove all blisters. Inflate the tire the same as for riding purposes *after placing it in the sectional mold* and cure 30 minutes at 50 pounds steam pressure.

Clincher Bicycle Cases

CUT out a small square of the rubber tread at point of puncture ¾ inch larger than the hole. Inside, wash with benzine, a space 2 inches larger than you cut down on the outside. Apply two coats of No. 434 cement inside and out, drying each coat one hour. Put two plies of No. 4130 fabric (stepped) on the inside, rolling them down carefully. Outside put one ply of No. 4130 fabric, the size of your cut-down, and fill up flush with No. 817-G gum, curing each side 10 minutes on a flat press.

Facts and Pointers for the Guidance of Repair Men

1. DO NOT ATTEMPT EXTENSIVE REPAIRS ON CASES WITH SEPARATED FABRIC. The heat will expand the air between the plies and increase the damage.

2. NEVER PROCEED WITH REPAIRS while the fabric is WET. See that it is thoroughly dried out.

3. REPAIRS ON LARGE CASES CANNOT BE cured through, unless the cure is finished on an inside steam vulcanizer. You can expect failure where this course is not followed.

4. Use only the BEST GRADE OF BENZINE OR GASOLINE. A low grade of these will affect your repairs more than you imagine. Complete and rapid evaporative properties are absolutely essential.

5. BLOW THE WATER OUT OF YOUR SECTIONAL VULCANIZER occasionally. If you do not you will get some erratic cures.

6. ANY AIR BAG USED IN A SIZE LARGER CASE than that intended must be properly padded otherwise the bag will be ruined. Always use the proper size. The life of an air bag can be greatly prolonged if handled properly.

7. AN AIR BAG SHOULD NEVER BE REMOVED FROM THE CASE by grabbing hold of the tube. You will tear the tube sooner or later. Take the air bag by its lower end and force it out by putting the hand underneath it.

8. ROUND OUT YOUR AIR BAGS with a little air when not in use. This helps to preserve them.

9. RETREADED OR REPAIRED CASES should be put into service immediately to obtain maximum results. They deteriorate faster than new cases and if held until the emergency arises for their use, they may prove unsatisfactory.

FACTS AND POINTERS—Cont.

10. WHEN REMOVING A CASE FROM THE VULCANIZER, if it shows a tendency to blister, immerse in water. This will generally overcome the difficulty. EXTENSIVE BLISTERING OF A REPAIR usually comes from either improperly cleaning the carcass, moisture in the fabric or not allowing the cement to dry. Porous spots indicate insufficient pressure, unevaporated benzine or moisture in the cement.

11. BLOWOUT REPAIRS WHICH GO BAD are due either to not stepping the fabric back far enough, failure to protect the edges of the new fabric with thin strips of No. C-116 gum, or lack of a thorough cure. Any unevenness in the repair will prevent an equal distribution of the strain and result in a hinge, which will soon break through.

12. REPAIRS WILL PRESENT A MUCH NEATER APPEARANCE if the ragged edges are smoothed off with a file before the case goes out of your hands.

13. IF ONLY ONE OR TWO PLIES OF FABRIC on the inside of a case ARE BROKEN and these breaks appear at several places, the case may be made to give its mileage by relining it with one or two plies of No. 2130 fabric, the outside ply of the reliner to be frictioned one side only. After thoroughly cleaning the inside of the case use No. C-126 or No. C-116 cement for applying the reliner.

14. AFTER CEMENTING A CASE FOR REPAIR, do not place in a draft to dry. This allows a hard film or crust to form on the surface of the cement, while it remains soft underneath. Blistering will result.

15. CEMENT SHOULD NOT DRY OVER TWELVE (12) HOURS, as there is such a thing as allowing it to dry too long. Its adhesive qualities are thereby lost and the purpose of its use defeated, especially if it is of inferior quality.

16. KEEP YOUR GUM STOCK CLEAN and covered up from light and air. If dry, freshen up by washing well with benzine. Do the same if soiled or dirty. Let benzine thoroughly evaporate before using stock, and do not use anything but a high test gasoline or benzine.

FACTS AND POINTERS—Cont.

17. IF GUM STOCK STICKS TO LINER, wet opposite side of liner with benzine. This will remedy the trouble.

18. DUST CASES AND VULCANIZER WITH SOAPSTONE before applying cure. For this purpose put two pounds of soapstone in a cheese cloth bag. It will sift through as you need it.

19. To overcome STICKING OF AN OLD CASE to vulcanizer, apply thin coat of No. 1 or No. 4 cement to case and dust with soapstone.

20. CLEAN OUT CAVITIES OF YOUR VULCANIZER with emery paper occasionally. This will remove all particles of dirt or old gum which otherwise will mar the appearance of your repair.

21. DO NOT BUY EQUIPMENT THAT IS TOO LIGHT. That which will stand extra strains and pressure is going to prove best in the long run, even if the initial cost is greater.

22. USE ONLY THE BEST MATERIALS you can procure. Rubber is a vegetable product, called upon to do the work of steel. The best is none too well adapted to the work cut out for it.

23. USE JUDGMENT IN ADVISING REPAIRS. Don't make them where you know you are gambling on the ultimate outcome. A bad repair is a black eye for you and the repair business in general.

24. WHEN APPLYING A TIRE DO NOT MAKE TOO FREE USE OF SOAPSTONE. A quantity of this collecting in one place will generate heat and give the inner tube the appearance of being soft and bubbly.

25. GOODRICH REPAIR MATERIALS embody the experience of over 40 years in the preparation of high-grade rubber. They may be depended upon under all circumstances.

26. STIR CEMENTS THOROUGHLY AND OFTEN.

27. ALL CURED RUBBER SHOULD BE ROUGHENED before applying cement, to aid adhesion.

Unvulcanized Tread Band Dimensions

Table of dimensions and number of plies for building up unvulcanized tread bands, using 1/16″ thicknesses.

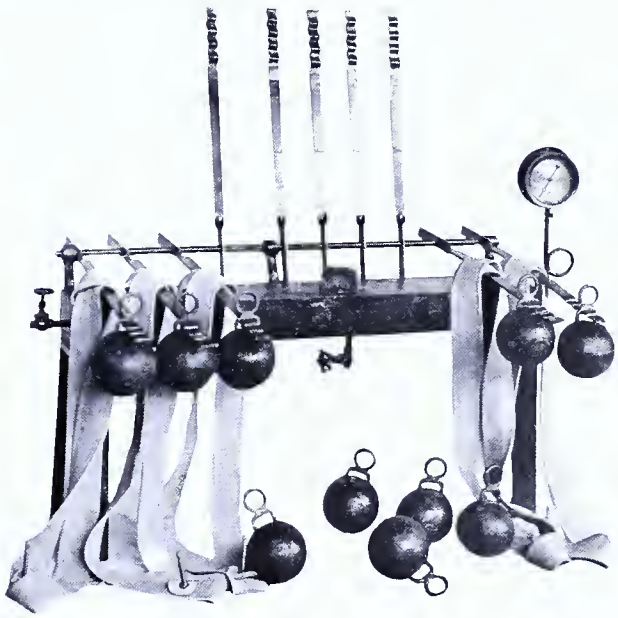
Size	Width of Widest Ply	No. Plies	Length of Band
26x2½	3½	2	6′ 6″
28x2½	3½	2	6′10″
30x2½	3½	2	7′ 4″
26x3	4½	2	7′ 2″
28x3	4½	2	7′ 2″
30x3	4½	2	7′ 6″
32x3	4½	2	8′ 0″
34x3	4½	2	8′ 6″
36x3	4½	2	8′10″
28x3½	5	3	7′ 2″
30x3½	5	3	7′ 6″
32x3½	5	3	8′ 0″
34x3½	5	3	8′ 6″
36x3½	5	3	8′10″
30x4	5¾	3	7′ 6″
32x4	5¾	3	8′ 0″
34x4	5¾	3	8′ 6″
36x4	5¾	3	8′10″
38x4	5¾	3	9′ 2″
40x4	5¾	3	9′ 6″
42x4	5¾	3	10′ 0″
32x4½	6½	4	9′ 2″
34x4½	6½	4	8′ 6″
36x4½	6½	4	8′10″
38x4½	6½	4	9′ 2″
42x4½	6½	4	10′ 0″
34x5	7¼	5	8′ 4″
36x5	7¼	5	8′10″
42x5	7¼	5	9′ 6″
42x5½	8	5	9′ 6″
36x6	8¾	5	9′ 0″
41x6	8¾	5	9′ 4″

Some of the Tools Mentioned in the Foregoing Instructions

BENCH BUFFER AND GRINDER

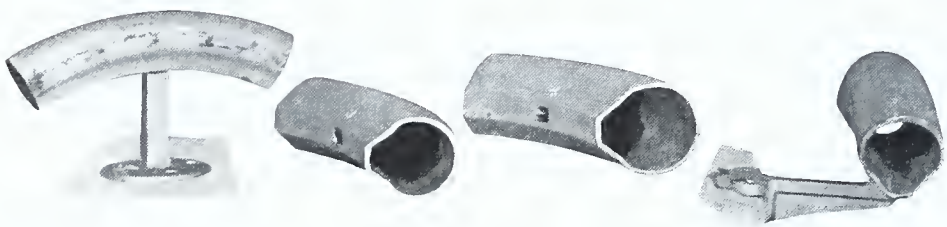
WIRE BRUSHES
Large—The Economy Brush
Small—No. 205 Advance Brush with Flanges

ROTARY RASP

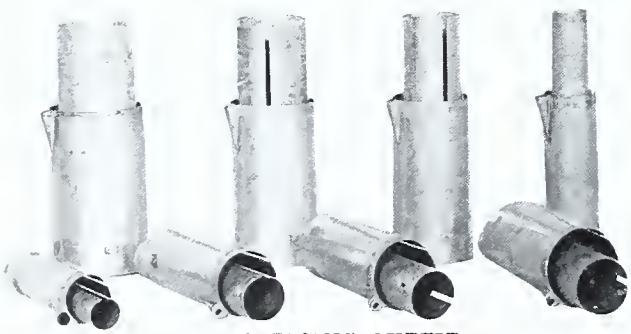


FLAT PRESS

RETREADING COIL



TIRE FORMS



TUBE SPLICING OUTFIT

Repair Equipment

Repair Tools

Reading from left to right—

1. Flat Roller.
2. Fabric Knife.
3. Concave Roller.
4. Awl.
5. Large Stitcher.
6. Small Stitcher.
7. Rubber Knife.
8. Rubber Knife.
9. Shears.
10. Pliers.

Goodrich Repair Materials

Body Fabric No. 2130

Best quality of fabric frictioned both sides and skim coated on one side. For sectional and inside repairs on auto cases. Furnished in 5, 10, 25, 50 and 100 pound rolls approximately 47″ wide. Also put up in ½ and 1 pound cartons. Cures 45 minutes at 50 pounds steam pressure in cavity vulcanizer or 45 minutes at 35 pounds in pot-heater. Weight per square yard 2.0 pounds.

Body Fabric No. 2140

Same as above but frictioned and coated on both sides. Weight per square yard 2.2 pounds. Furnished in 5, 10, 25, 50 and 100 pound rolls 47″ wide.

Body Fabric No. 2120

Same grade of fabric as those above but frictioned both sides. Put up in same width and quantities. Weight per square yard 1.8 pounds.

Relining Fabric No. 2110

Coated on one side only, for relining purposes. Weight per square yard 1.5 pounds. Furnished in 5, 10, 25, 50 and 100 pound rolls, 47″ wide.

Bead Fabric No. 4130

Lighter weight than No. 2130, designed for bead repairs on auto cases. Frictioned both sides and coated one side. Furnished in 5, 10, 25, 50 and 100 pound rolls, approximately 47″ wide. Cures in 45 minutes at 50 pounds steam pressure in cavity vulcanizer or 45 minutes at 35 pounds in pot-heater. Weight per square yard 1.7 pounds.

REPAIR MATERIALS—Cont.

Breaker Strip Fabric No. 3140

A coarsely woven fabric frictioned and coated on both sides designed for breaker strips. Furnished in 10, 25, 50 and 100 pound rolls approximately 45″ wide. Cures 45 minutes in cavity vulcanizer at 50 pounds steam pressure, or 45 minutes at 35 pounds in pot-heater. Weight per square yard 2.9 pounds.

Red Unvulcanized Gum No. 788-G

This stock is especially designed for the repair of Automobile Tire Casings with Red sides or treads. Cures an attractive red shade. Furnished in 5, 10, 25 and 50 pound rolls 18″ wide. Standard thickness 1/16″. Cures 45 minutes at 35 pounds steam pressure in pot-heater, or cavity vulcanizer 45 minutes at 50 pounds. Weight per square yard (1/16″ thickness) 4.5 pounds.

Unvulcanized Gum No. W-10

A specially high-grade gum for sectional repairs and retreading. Cures a white shade to match light tread tires. Furnished in 5, 10, 25 and 50 pound rolls, 18″ wide. Standard thickness 1/16″. Cures in cavity vulcanizer 45 minutes at 50 pounds steam pressure or 45 minutes at 35 pounds in pot-heater. Weight per square yard (1/16″ thickness) 4.20 pounds. Low specific gravity and exceptional wearing quality.

Unvulcanized Gum No. W-20

A moderately priced gum for all classes of repairs; sectional or retreading. Cures a light grey, and is an all-round satisfactory article. 5, 10, 25 and 50 pound rolls, 18″ wide. Standard thickness 1/16″. Cures in cavity vulcanizer 45 minutes at 50 pounds steam pressure or 45 minutes at 35 pounds in pot-heater. Weight per square yard (1/16″ thickness) 5.2 pounds.

REPAIR MATERIALS—Cont.

Unvulcanized Gum No. 817-G

A moderate priced gum for general repairing and retreading. Cures a dark shade. Furnished in 5, 10, 25 and 50 pound rolls, 18″ wide. Also put up in ¼, ½ and 1 pound cartons. Standard thickness 1/16″. Cures 45 minutes at 35 pounds steam pressure in pot-heater or in cavity vulcanizer 45 minutes at 50 pounds. Weight per square yard (1/16″ thickness) 4.6 pounds.

Black Unvulcanized Gum No. 677-G

With the introduction of the Black Tread Automobile Tire came the development of this stock suitable for its repair. Cures a deep Black. Furnished in 5, 10, 25 and 50 pound rolls 18″ wide. Standard thickness 1/16″. Cures 45 minutes at 35 pounds steam pressure in pot-heater, or in cavity vulcanizer 45 minutes at 50 pounds. Weight per square yard (1/16″ thickness) 4.8 pounds.

"Camel Back" Unvulcanized Retreading Stock

Can be furnished in any of our various grades of tread stock—smooth tread only. Neatly wrapped in liner.

For 3″ and 3½″ tires in 10-lb. rolls.
For 4″ tires in 20-lb. rolls.
For 4½″, 5″, 5½″ and 6″ tires in 25-lb. rolls.

REPAIR MATERIALS—Cont.

Combination Repair Sheet

Cured gum coated with an uncured gum for inner tube repairs and for the inside ply of single tube tire repairs. Furnished in 5, 10, 25 and 50 pound rolls. Approximately 35 inches wide. Also in ¼, ½ and 1 pound cartons. Cures 15 minutes at 50 pounds steam pressure. Weight per square yard 3.3 pounds.

Patching Rubber—P-215

Pure Gum Patching Sheet in ¼, ½ and 1 pound packages, for general patching purposes. Furnished in one standard thickness 1/32".

Weight per square yard (1/32" thickness) 1.1 lbs.

Cement and Cushion Gum No. C-116

Highest quality repair gum and cement stock. An ideal cushion stock between carcass and tread, also for inner tube repairs. Cures a dark gray color. Furnished in 5, 10, 25 and 50 pound rolls, 18" wide. Thickness 1/64", 1/32" and 1/16". Cures in cavity vulcanizer 45 minutes at 50 pounds steam pressure or in pot-heater 45 minutes at 35 pounds. Weight per square yard (1/16" thickness) 3.2 pounds.

Cement and Cushion Gum No. C-126

A high-grade gum for cushion between tread and carcass, and for applying semi-cured bands. Furnished in 5, 10, 25 and 50 pound rolls, 18" wide. Thickness 1/64", 1/32" and 1/16". (Use with No. C-126 cement for applying bands.) In cavity vulcanizer cures 45 minutes at 50 pounds steam pressure. In pot-heater cures 45 minutes at 35 pounds with raw tread bands, 30 minutes at 35 pounds with semi-cured bands. Weight per square yard (1/16" thickness) 5.2 pounds.

REPAIR MATERIALS—Cont.

Unvulcanized Gum No. C-336

Especially high grade gum for the repair of Red or Brown Inner Tubes. Cures dark red with a brownish cast so as to harmonize with either a Red or Brown Inner Tube. Furnished in ¼, ½ and 1 pound cartons. Also in 5, 10, 25 and 50 pound rolls. Standard thickness 1/16". Weight per square yard 3.3 pounds.

Goodrich Rubber Cement No. 1 (Heavy)

For repairing and splieing inner tubes. Possesses great strength and is very effeetive. A self-euring cement also used in conneetion with our aeid-curing solutions. In ¼ pint, 1 pint, 1 quart and 1 gallon eans; also 50 gallon barrels.

Goodrich Rubber Cement No. 4 (Medium)

A plugging and patching eement, made of pure Para Rubber. Used the same as No. 1 cement.

It is impossible to better the quality of this cement, yet the priee is extremely moderate. The standard by whieh all other cements are judged. In ¼ pint, 1 pint, 1 quart and 1 gallon cans; also 50 gallon barrels and ¾"x4" and 1"x4" tubes.

Goodrich Vulcanizing Cement No. 434 (Heavy)

It is the highest grade cement of its class ever manufaetured.

A shop repair eement used in connection with steam vulcanizers.

Long reeognized as the standard vulcanizing cement. For general repairs on tubes and cases.

¼ pint, 1 pint, 1 quart and 1 gallon cans; also in 50 gallon barrels.

REPAIR MATERIALS—Cont.

Goodrich Vulcanizing Cement No. 906

A very high quality Vulcanizing cement for retreading with semi-cured bands. In ¼ pint, 1 pint, and 1 quart and 1 gallon cans.

Goodrich Plastic

A self-drying, self-curing cement that will effectively seal small tire cuts, and thereby prevent exposure of the fabric to the disintegrating effects of moisture and grit. Plastic is easy to use, not mussy and stays put. It comes in small cans containing two ounces. A good selling line for dealers.

Air Bags

Air bags are an essential part of a cavity vulcanizer equipment. Their purpose is to inflate the case at the point of repair and exert sufficient pressure on the new gum to insure its curing properly. GOODRICH AIR BAGS are made of especially selected material, presenting the highest possible degree of elasticity, combined with toughness and resistance to heat.

They should be inflated to a pressure of 50 lbs., and under no circumstances should they be used in cases larger than that for which they are intended. A complete equipment comprises the following sizes:

No. 1 for 2½ in. cases ..... length 20 in.
No. 2 for 3 in. cases ..... length 20 in.
No. 3 for 3½ in. cases ..... length 20 in.
No. 4 for 4 in. cases ..... length 20 in.
No. 5 for 4½ in. cases ..... length 20 in.
No. 6 for 5 in. cases ..... length 20 in.
No. 7 for 5½ in. cases ..... length 20 in.

REPAIR MATERIALS—Cont.

Goodrich Vulcanizing Solution No. 071

An extra strong solution for splicing inner tubes and applying cured patches. Cures in 10 minutes. In ¼ pint, 1 pint, 1 quart and 1 gallon bottles.

Goodrich Solution No. 090

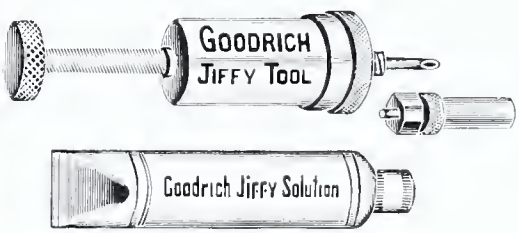
A white solution for painting the inside of cases and to prevent sections *repaired* from sticking to inner tubes.

Goodrich Self-Vulcanizing Patches

Are most handy and effective for repairing small punctures or cuts in inner tubes.

Simply moisten the patch with gasoline, clean and roughen the tube around injury, and stick on the patch. The heat of the moving tire is sufficient to firmly vulcanize the repair.

Goodrich Jiffy Repair Solution



Jiffy provides a ready means of instantaneously repairing small punctures in single tube tires, where the hole is too small to require a rubber plug or sectional repair. A Jiffy outfit contains one Jiffy tool and one tube of Jiffy solution.

Goodrich Hard Tire Cement

A safe and dependable cement for cementing single tube bicycle tires to the wheel rim, whether wood or metal. A notable feature is that the cement forms a heavy cushion between the tire and rims, preventing rim-cutting. A heavy coating should be applied to both tire and rim.

REPAIR MATERIALS—Cont.

Goodrich Liquid Wood Rim Cement

An ever ready cement for cementing bicycle tires to wood rims.

Goodrich Patches

Patches for Automobile Inner Tubes

Pure Rubber.

No. 1.

No. 2.

No. 3.

Sold separately or assorted six to a set.

Patches for Motorcycle Tubes

The Goodrich Motorcycle Patches are made of pure rubber. The tapered edge cemented to the tube will prevent the patch loosening.

Sizes: 1 in., 1¼ in., 1½ in., 1¾ in. and 2 in. Sold separately or in assorted lots of one dozen.

REPAIR MATERIALS—Cont.

Goodrich Retreading Bands (Semi-Cured)

SAFETY 5-BAR

SAFETY 7-BAR

The best of tires will wear out eventually and require new treads if their life is to be prolonged. A retread band properly applied will give the user many miles of added service—how many depends on the quality of the new tread.

Here are two styles—the 5-bar Safety and the 7-bar Safety Tread Bands. They are both made of the same high quality stock which is used in Goodrich Tires and are shipped semi-cured, ready for vulcanization.

The 5-bar Safety is for 3½-inch or smaller tires, the 7-bar for 4-inch or larger.

Soapstone

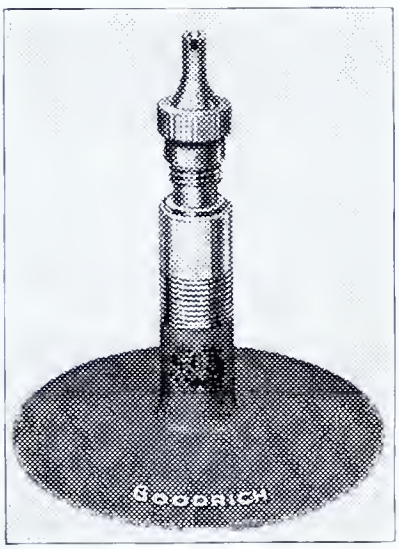
Best quality of powdered talc, suitable for use in repair work or in cases. Should be carried by every automobile driver. Sold in Swivel Top Tubes, 5 and 10 lb cans or in 100 lb sacks.

Automobile Tire Inflating Tubing

Usually supplied with black cover, although furnished with white or red cover if desired. Standard sizes 1/8″, 5/32″, 3/16″ and 1/4″. Standard weight, 5 ply. Furnished 3 or 4 ply if desired. Maximum length 1/4″—50 feet. Smaller sizes, 12 feet.

REPAIR MATERIALS—Cont.

Valves and Valve Fittings



SCHRADER RUBBER BASE VALVE AND STEM COMPLETE

RUBBER BASE VALVE STEM

Rubber Base Valve Stems

Rubber valve stems for Schrader valves are furnished either with or without the valve. For single tube bicycle tires and inner tubes.

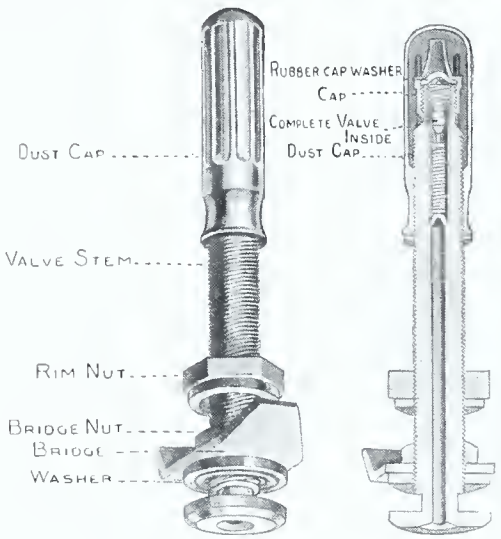
Metal Base or Shoe Valves

VALVE COMPLETE

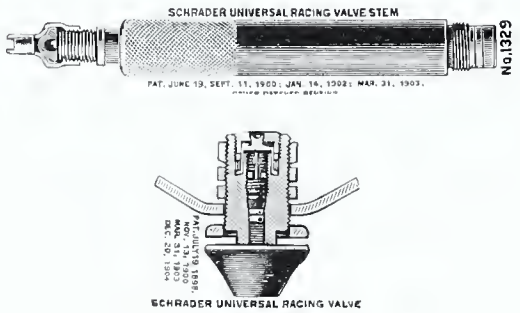
A special type of Schrader Valve designed for repairing bicycle tires.

REPAIR MATERIALS—Cont.

Valves and Fittings



Schrader Universal Valves can be furnished in any size or quantity for automobile, motorcycle and bicycle tubes. Also split valves for dual demountable rims and valve parts.



Schrader No. 967, 3″ long from base to end of large thread on male. For 3½″, 4″, 4½″, 5″ and 5½″ tubes.

Schrader No. 777, 3″ long from base to end of male. For 3″ tubes.

Schrader No. 792, 3¾″ long from base to end of large thread on male; takes same valve parts as No. 967.

No. 1822, 2″ long from base to end of large thread on male, for use with wire wheels.

Schrader No. 895, Racing Motor Tire or Split Valves for Demountable Rims.

No. 1329 Extension Stem for No. 895 Split Valves.

REPAIR MATERIALS—Cont.

Goodrich Combination Blow-out Patch

This is in reality two patches, one for the inner side, which fits snugly inside the casing and prevents the tube being nipped, while the outer one is of more substantial construction and resembles a tire section or "shoe." This laces around the outside of the injured spot and effectually prevents the ingress of dirt or wet.

Double Wing Blow-out Patch

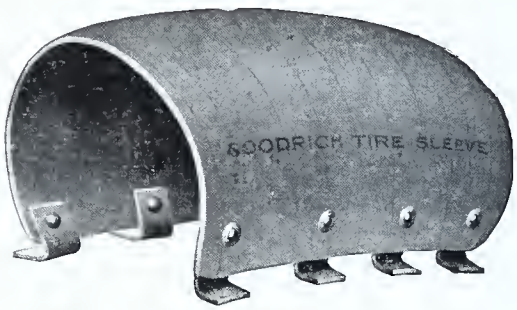
This patch is made with wings on both sides which fit under the beads of the casing, making it impossible for it to creep or move and also making it adaptable to both blow-out or rim-cut.

It is molded to shape and as a result is very easily put in position. For a temporary repair, no other type of patch or reinforcement can do the work so quickly and at such a low cost.

Length 7 inches to 18 inches according to size of tire for which it is intended. No cementing or other preparing is necessary. It is ready for use when you buy it.

REPAIR MATERIALS—Cont.

Goodrich Clincher Tire Sleeve



The Goodrich Clincher Tire Sleeve overcomes the defects common to all other sleeves. It fits over the casing and inside the rim and is held in place by steel hooks extending under the clinch of the rim. It is quickly and easily applied and absolutely will not creep or move. Covering as it does every portion of the tire, it is the only sleeve that is as good for rim-cut as for a puncture or blow-out on the tread.

The Goodrich Tire Sleeve is made of the finest quality rubber and fabric, and is therefore an ideal temporary repair for a large break in the casing.

A blow-out patch which accompanies each sleeve should be used between the casing and the tube when the break in the tire extends through to the inside.

Both Regular Clincher and Straight Bead Tire Sleeves are made in various sizes as follows:

For Automobile Tires:—3, 3¼, 3½, 3¾, 4, 4¼, 4½, 4¾, 5, 5¼ and 5½ inches.

The 3¼-inch size is intended for use on 3-inch Safety Tread Casings or on old 3-inch Smooth Tread Casings that are stretched from usage.

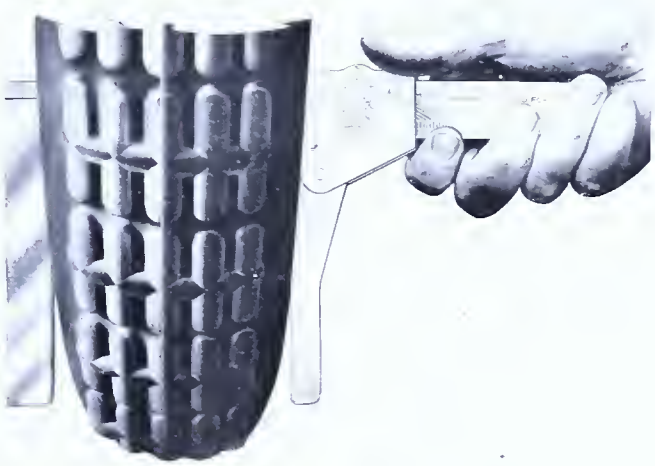
The 4¼-inch size is for use on 4-inch casings, 4¾-inch on 4½-inch casings and the 5¼-inch on 5-inch casings under same conditions.

For Motorcycle Tires:—Clincher type only, 3 and 3½ inch.

Goodrich Straight Bead Tire Sleeve

The Goodrich Straight Bead Tire Sleeve is for use on any straight side casing. It is held in place by steel hooks which extend under the bead of the tire itself.

Goodrich Tire Caliper Gauge



90% of all tire breakdowns are due to Underinflation. Most gauges now sold are inaccurate, liable to get out of order and *all* are based on a predetermined load—a theoretical weight.

The Goodrich Tire Caliper Gauge "measures" the deflection in the tire wall instead of gauging the inflation by pounds pressure. It's absolutely accurate—it is BASED ON YOUR ACTUAL LOAD. Easiest thing in the world to operate—nothing to get out of fix. It shows the exact inflation each car-owner should carry in his individual tires.

In leather holster—*retails at* $1.00.

Don't Overload Your Tires

THE *normal tires* of a car are calculated to carry an ordinary load, with a fair margin of safety over and above this point.

It must not be forgotten, that while the air pressure on the tires of an unloaded car may be normal, this pressure is immensely increased by the addition of a further 1,000 pounds of passengers and baggage.

Weight and Inflation Schedule

3"	45 lbs.	375 lbs. load
3½"	55 lbs.	570 lbs. load
4"	65 lbs.	815 lbs. load
4½"	75 lbs.	1,100 lbs. load
5"	80 lbs.	1,300 lbs. load
5½"	85 lbs.	1,700 lbs. load
6"	90 lbs.	2,000 lbs. load

Motorists contemplating extended tours should consult the above table, and equip themselves with the Goodrich Tire Caliper Gauge described on page 39, thus insuring themselves from the possibilities of overloading troubles.

It also goes without saying that the extra space tends to increase comfort by absorbing road shock and hence ensuring smoother running.

Goodrich Interchangeable Tires

Size Tire	Size Rims They Fit	Style Made in
31x3½	30x3	Regular Clincher
31x4	30x3½	" "
33x3	32x3½	Straight Bead
33x4½	32x4	" "
35x4½	34x4	" "
35x5	34x4½	" "
37x5	36x4½	" "

Care of Cases and Tubes Not in Service

Light, heat and moisture play an important part in the natural deterioration of rubber. This may be controlled to a large degree if the following simple suggestions are acted upon.

Mounted Tires

Remove all weight and strain from the tires. The car should be jacked up so that the tires are clear of the floor, after which the air pressure should be reduced until just enough remains to hold the tires nicely rounded out. This should be done if the car is to be idle for any length of time.

All oil and grease spots should be removed as soon as noticed, from tires and tubes whether in use or in storage. Wash off with gasoline or soap and water.

Carry extra tires in tire covers. The heat and light from the sun beating on an unprotected extra tire will shorten its life in proportion to the length of time the tire has been exposed. The tire cover will not keep out the heat, but it will exclude the light.

Unmounted Cases

Examine all cases inside and out. Irregularities should be corrected immediately. The repair of a small, insignificant looking injury will invariably save money in the end.

If moisture and dirt have reached the fabric no time should be lost in seeking advice.

Never hang cases on nails or pegs or lean them against anything if they are to remain there more than a few hours—always lay flat in a dark, dry, cool place. The temperature should not exceed 60 degrees; 30 to 40 is preferable. In the absence of a dark room the tires should be covered or wrapped to exclude the light. Burlap or light muslin may be used for this.

Tubes

Tubes should be stored under the same conditions as cases.

Never hang a tube on a nail or peg—always lay it flat.

Tubes inflated sufficiently to round them out can be laid on the inside of cases that are in storage. This is really better than to lay them flat.

Extra tubes *stored in the automobile* for emergencies should be wrapped tightly in paper or cloth or placed in a tube bag, otherwise they are liable to chafe through.

Tubes should never be carried in tool boxes. Oil and grease will get on them there.

NOTE:—The repairmen should see that these suggestions are passed on to their customers. Few motorists know how to store tires properly.

Goodrich National Touring Bureau

THE Goodrich National Touring Bureau is the largest enterprise of its kind, either public or private, in the country. It was established for the express purpose of giving free aid to motorists on contemplated tours. The Goodrich Touring Bureau compiles and places at the disposal of all motorists in this country (no matter what brand of tire they may use) the most complete, up-to-date fund of touring information to be had. A large number of the more popular tours in the majority of the states have been put up in book form. Besides these, Road Logs covering practically any trip on main lines of travel may be had from our dealers, branches and depots or by writing direct to the main office, Akron, Ohio.

Another very important phase of the work done by the Goodrich National Touring Bureau is their Guide Posting—over 110,000 miles of American Roads with more than 90,000 Road Signs. This work has unquestionably done much to stimulate the good roads movement, develop American touring and add to the rapidly growing desire among motorists to "See America First."

We earnestly urge you and your patrons to take advantage of this great service. All Goodrich dealers should have on hand at all times a supply of Goodrich State Maps and other touring information. By aiding and stimulating touring, the dealer automatically increases his sales possibilities. Do not hesitate to call on the Goodrich National Touring Bureau for this touring data because it will always be supplied gladly and without obligation.

How Goodrich Company Took on the Burden of Proof

It costs a lot of money to operate five test car fleets continuously for eight or more months over thirty-five different states, but as the philosopher puts it, the ends justify the means.

We gained a first-hand undeniable road proof that Goodrich Tires stand up and deliver far better than the average mileage on any road. The exact figures show an aggregate mileage exceeding the 4,000,000 mark and with an average tire mileage of 6,321.

It is a great showing with nothing like it in tire annals as a complete quality guide to the tire buyer.

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